SINGER RANCH WATER SYSTEM (PWSNO 1280174)
SOURCE WATER ASSESSMENT REPORT

December 13, 2001

State of Idaho
Department of Environmental Quality

Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the act. This risk assessment is based on a land use inventory in the well recharge zone, sensitivity factors associated with how the well was constructed, and aquifer characteristics.

This report, *Source Water Assessment for Singer Ranch Water System*, describes the public drinking water well; the well recharge zone and potential contaminant sites located inside the recharge zone boundaries. This assessment, taken into account with local knowledge and concerns, should be used as a planning tool to develop and implement appropriate protection measures for this public water system. **The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system.**

A 240-foot deep well pumping from the Rathdrum Prairie Aquifer supplies Singer Ranch Water System drinking and irrigation water. The water system serves 35 people in a rural residential neighborhood about 1.25 miles east of Rathdrum, Idaho. Historically, Singer Ranch Water System has had few water quality problems other than bacterial contamination. Extensive repairs to the system were completed in February 1997 to deal with the problem. Bacteria were present in only two unconfirmed monthly samples since then. A ground water susceptibility analysis conducted by DEQ October 30, 2001 found the well to be moderately susceptible to all classes of regulated contaminants.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a “pristine” area or an area with numerous industrial and/or agricultural land uses that require education and surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

Because 186 public water systems in Idaho draw water from the Rathdrum Prairie Aquifer, they should consider forming a regional group to represent their interests before state, county and municipal governing bodies when regulatory tools like zoning overlays, or enactment of building codes are the most appropriate ground water protection measures. Partnerships with state and local agencies and industry groups should also be established. For instance, drinking water protection activities for agriculture, an important land use in the Singer Ranch well recharge area, should be coordinated with the Idaho State Department of Agriculture, local Soil Conservation District, and the Natural Resources Conservation Service

For drinking water protection in its own service area the Singer Ranch Water System should promote back flow prevention. Back siphonage from automatic irrigation systems and stock tanks are a particular concern in a rural area. Proper septic tank maintenance and operation are another "must" for ground water protection where there is no municipal sewage system.

Due to the time involved with the movement of ground water, source water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. For assistance in developing protection strategies, please contact your regional Department of Environmental Quality office or the Idaho Rural Water Association.

SOURCE WATER ASSESSMENT FOR SINGER RANCH WATER SYSTEM

Section 1. Introduction - Basis for Assessment

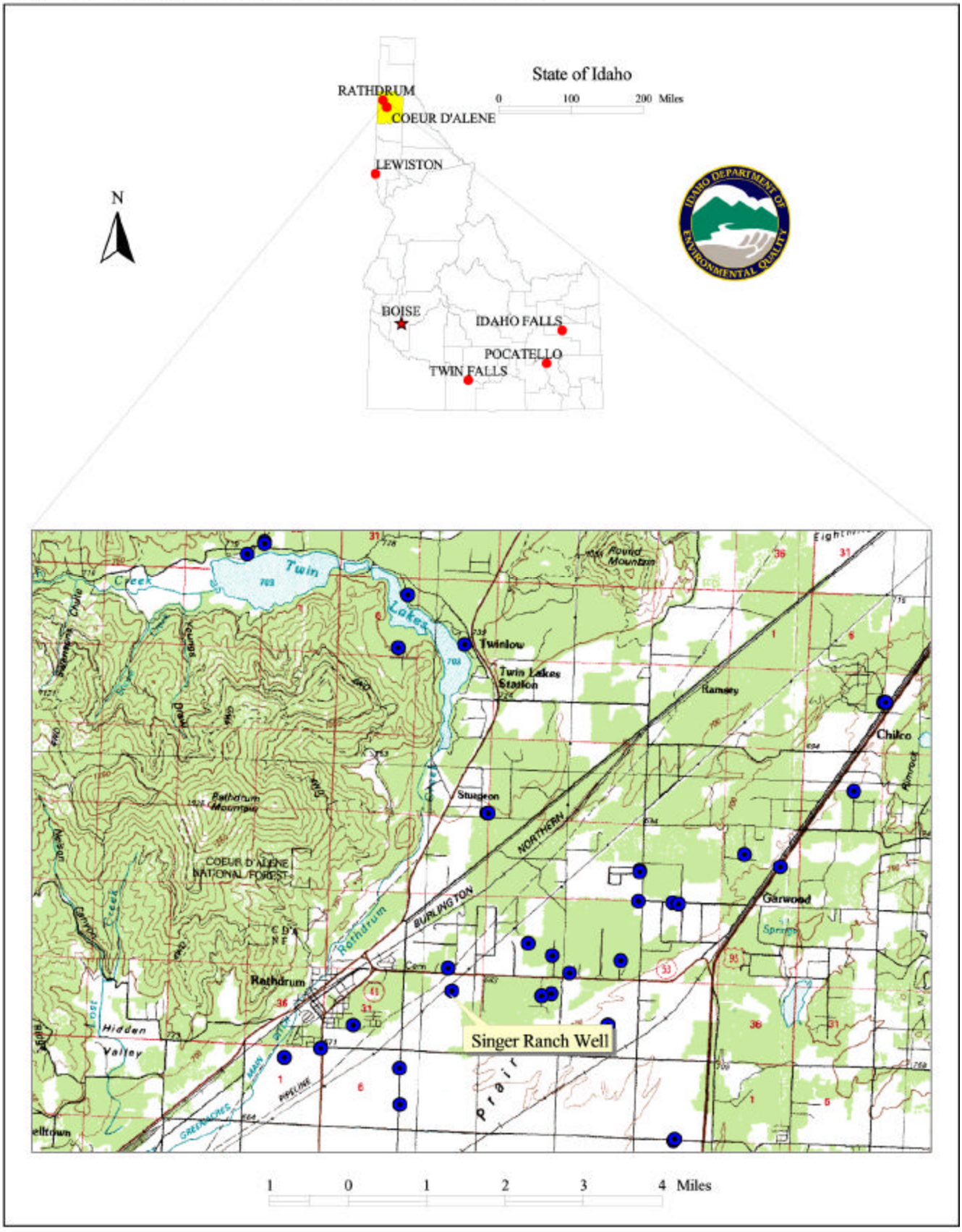
The following sections contain information necessary for understanding how and why this assessment was conducted. **It is important to review this information to understand what the ranking of this source means.** A map showing the delineated source water assessment area and an inventory of significant potential sources of contamination identified within that area are included. The ground water Susceptibility Analysis Worksheet used to develop this assessment is attached.

Level of Accuracy and Purpose of the Assessment

The Idaho Department of Environmental Quality (DEQ) is required by the U.S. Environmental Protection Agency (EPA) to assess every public drinking water source in Idaho for its relative susceptibility to contaminants regulated by the Safe Drinking Water Act. These assessments are based on a land use inventory inside the delineated recharge zones, sensitivity factors associated with how the well is constructed, and aquifer characteristics. The state must complete more than 2900 assessments by May of 2003. Because resources and the time available to accomplish assessments are limited, an in-depth, site-specific investigation for every public water system is not possible.

The results of the source water assessment should <u>not be</u> used as an absolute measure of risk and they should <u>not be</u> used to undermine public confidence in the water system. The ultimate goal of this assessment is to provide data to local communities for developing a protection strategy for their drinking water supply. The Idaho Department of Environmental Quality recognizes that pollution prevention activities generally require less time and money to implement than treating a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The decision as to the amount and types of information necessary to develop a source water protection program should be determined by the local community based on its own needs and limitations. Wellhead or source water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

Figure 1. Geographic Location of Singer Ranch Water System



Section 2. Preparing for the Assessment

Defining the Zones of Contribution - Delineation

The delineation process establishes the physical area around a well that will become the focal point of the assessment. The process includes mapping the boundaries of the well recharge area into time of travel zones indicating the number of years necessary for a particle of water flowing through the aquifer to reach a well). DEQ used a refined computer model approved by the EPA to determine the time of travel (TOT) for water pumped from the Rathdrum Prairie Aquifer. The computer model used data assimilated by DEQ from a variety of sources including local well logs. Keith Thomas also supplied pumping data and supplementary information about the Singer Ranch Water System well.

Singer Ranch Water System is a community water system with 14 connections serving a population of 35 people in a rural neighborhood about 1.25 miles east of Rathdrum (Figure 1). The well was hand dug in 1963 for irrigation purposes and converted to a domestic system in 1979.The pumping capacity is 500 GPM. The recharge zone for the Singer Ranch Water System well is a narrow corridor stretching northward from the well for about 4 miles and encompassing 114 acres. The delineation is divided into 0-3, 3-6 and 6-10 year time of travel zones (Figure 2).

Identifying Potential Sources of Contamination

The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of ground water contamination. Inventories for all public water systems in Idaho were conducted in two-phases. The first phase involved identifying and documenting potential contaminant sources within a system's source water assessment area through the use of computer databases and Geographic Information System maps developed by DEQ. Maps showing the delineations and tables summarizing the results of the database search were then sent to system operators for review and correction during the second or enhanced phase of the inventory process. Information from the public water system file was also incorporated into the potential contaminant inventory. Keith Thomas reviewed the map and inventory for Singer Ranch Water System.

Figure 2, *Singer Ranch Water System Delineation and Potential Contaminant Inventory* on page 7 of this report shows the location of the Singer Ranch Water System well, the zone of contribution DEQ delineated for it, and potential contaminant sites in the vicinity. Land use inside the delineation boundaries is a mix of woodland, 5 to 10-acre residential lots and agriculture. Homes in the area are on individual septic systems. A rail line, a state highway and a pipeline cross the delineation boundaries.

Many potential sources of contamination are regulated at the federal level, state level, or both to reduce the risk of release. When a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation.

Section 3. Susceptibility Analysis

The susceptibility to contamination of all ground water sources in Idaho is being assessed on the following factors:

- physical integrity of the well,
- hydrologic characteristics,
- land use characteristics, and potentially significant contaminant sources
- historic water quality

The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. A high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for each well is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. The following summaries describe the rationale for the susceptibility ranking. The Susceptibility Analysis Worksheet for the Singer Ranch Water System well, Attachment A, shows in detail how the well was scored.

Well Construction

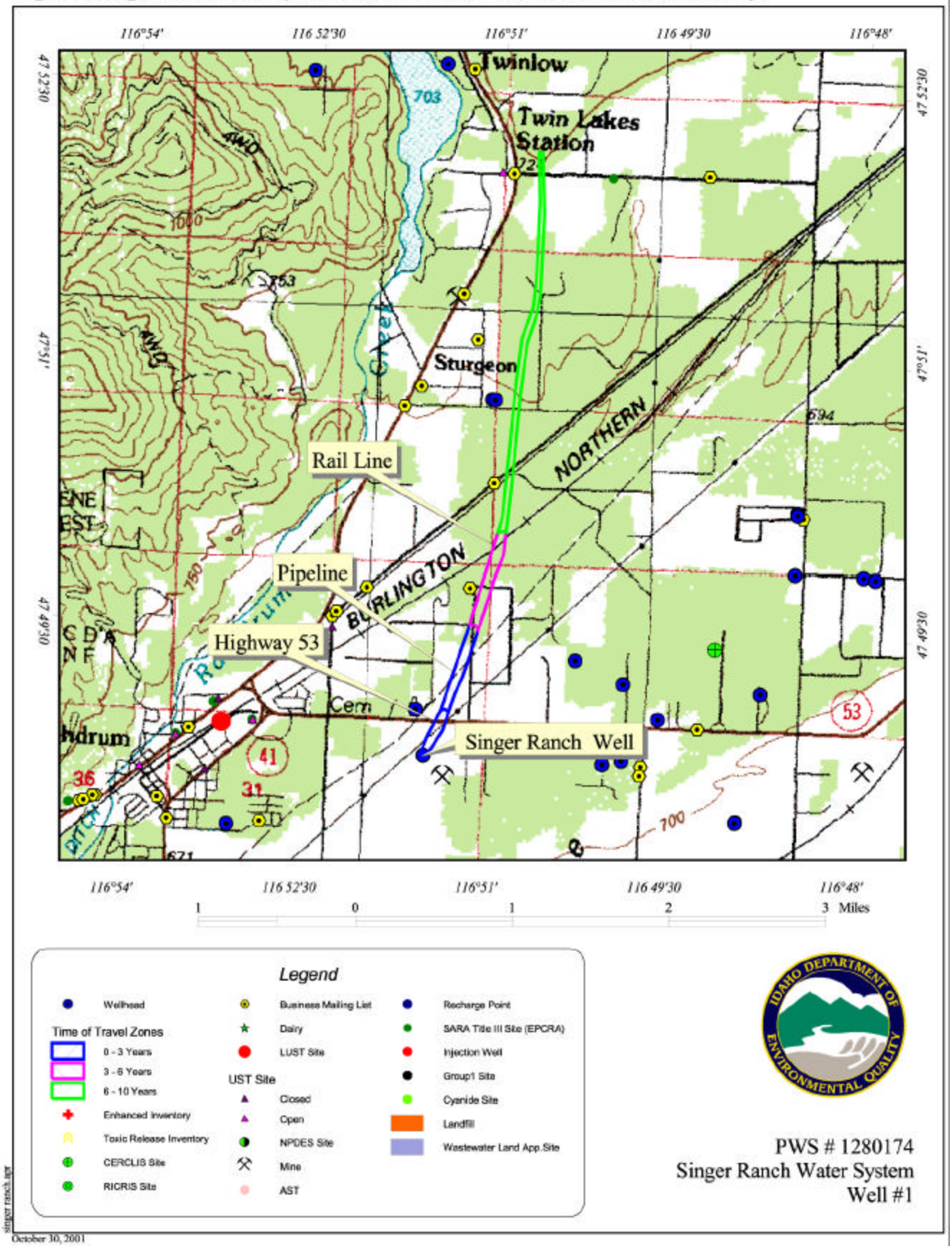
Well construction directly affects the ability of the wells to protect the aquifer from contaminants. Lower scores imply a well that can better protect the water. This portion of the susceptibility analysis relies on information from individual well logs, from the most recent sanitary survey of the public water system, and on pertinent information from the public water system file. The Singer Ranch Water System well log was found in a search of Idaho Department of Water Resources (IDWR) records. The last sanitary survey was completed in November 1995. Extensive repairs to the system were completed in February 1997.

The Singer Ranch Water System well was partially hand dug in 1964, then drilled to a depth of 234 feet. The well has a 30-inch steel casing, perforated from 204 to 232 feet below the surface. The well log gives no details about the surface seal, and no information about the soil structure at the well site. The static water level is at 203 feet. Current IDWR standards require the un-perforated well casing to extend at least 5 feet deeper than the static water level. The surface seal depth for drinking water wells needs to be at least 20 feet deep in an unconsolidated formation like the Rathdrum Prairie aquifer.

Table 1. Selected Construction Characteristics of Singer Ranch Water System Well

Well	Total Depth (ft.)	Depth of Surface Seal (ft)	Depth of Casing (ft)	Casing perforation Range (ft)	Static Water Level (ft
Well #1	234	Unknown	234	204/232	203

Figure 2. Singer Ranch Water System Delineation and Potential Contaminant Inventory.



Hydrologic Sensitivity

Hydrologic sensitivity scores reflect natural geologic conditions at the well site and in the recharge zone. Information for this part of the analysis is derived from individual well logs and from the soil drainage classification inside the delineation boundaries. The Singer Ranch Water System well scored 6 points out of 6 points possible in the hydrologic sensitivity portion of the susceptibility analysis.

Soils in the recharge zone generally are classed as moderately well to well drained. Soils that drain rapidly are deemed less protective of ground water than slow draining soils. The depth to ground water is less than 300 feet. The well log gives no description of the soil strata encountered while drilling, so the composition of the soil above the water table and the presence or absence of a fine grained aquitard to protect the ground water from vertical transport of contaminants are unknown. Nevertheless, the hydrologic sensitivity score for Singer Ranch is in the same range as scores for other wells on the Rathdrum Prairie Aquifer.

Potential Contaminant Sources and Land Use

Figure 2, *Singer Ranch Water System Delineation and Potential Contaminant Inventory* on page 7 shows the location of the Singer Ranch Water System well, and the recharge zone DEQ delineated for it. Land use inside the delineation boundaries is a combination of woodland and cropland with some residential development on 5 to 10-acre tracts. Homes in the area are on individual septic systems. Potential sources of contamination inside the delineation boundaries include State Highway 53 and a petroleum products pipeline in the 0-3 year time of travel zone and a rail line crossing the 3 to 6 year time of travel zone. County roads were not considered significant potential contaminant sites because they carry only low volume local traffic.

Table 2. Singer Ranch Water System Potential Contaminant Inventory

SITE DESCRIPTION	SOURCE OF INFORMATION	POTENTIAL CONTAMINANTS[1]
Highway 53	USGS and County Maps	IOC, SOC, VOC, Microbial
Pipeline	USGS Maps	SOC, VOC
Rail Line	USGS Maps	IOC, SOC, VOC, Microbial

[1] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Water Quality

Bacterial contamination is the chief historical water quality problem experienced by Singer Ranch Water System. Extensive repairs to the well followed by a thorough disinfection of the system appear to have brought the contamination under control. Only two monthly samples since 1997 have been positive for total coliform bacteria. The presence of bacteria was not confirmed by follow up sampling.

DEQ has granted waivers to Singer Ranch Water System to reduce the amount of testing required for synthetic organic compounds and volatile organic compounds, which have never been detected in the well. Radiological contaminants in concentrations far below the Maximum Contaminant Level (MCL) were present in samples tested in 1996 and 2000. Nitrate sampling results from 1993 to 1999 show concentrations ranging between 0.242 and 0.326 mg/l. The MCL for nitrate is 10 mg/l. Nitrate was not detected in samples tested in 2000 and 2001. When the water was tested in 1999 for other inorganic chemicals Fluoride (MCL = 4.0 mg/l) was present in a concentration of 0.20 mg/l; the Barium (MCL = 2.0 mg/l) concentration was 0.02 mg/l and the Arsenic (MCL = 0.05 mg/l) concentration was at 0.005 mg/l.

Final Susceptibility Ranking

The Singer Ranch Water System well ranked moderately susceptible to all classes of regulated contaminants, mostly because of unknown risk factors associated with the geology of the Rathdrum Prairie Aquifer. Totals for system construction and hydrologic sensitivity along with the cumulative scores for land use and potential contaminant sites are shown on Table 3.

The final scores for the susceptibility analysis were determined using the following formulas:

1) VOC/SOC/IOC Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.2)
2) Microbial Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.35)

The final ranking categories are as follows:

- 0 - 5 Low Susceptibility
- 6 - 12 Moderate Susceptibility
- > 13 High Susceptibility

The complete Susceptibility Analysis Worksheet for the Singer Ranch Water System well can be found in Attachment A.

Table 3. Summary of Singer Ranch Water System Susceptibility Evaluation

Cumulative Susceptibility Scores						
Well Name	System Construction	Hydrologic Sensitivity	Contaminant Inventory			
			IOC	VOC	SOC	Microbial
Well #1	4	6	10	12	12	6
Final Susceptibility Score/Ranking						
	IOC		VOC		SOC	Microbial
Well #1	12/Moderate		12/Moderate		12/Moderate	12/Moderate

IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical
HIGH* - Indicates source automatically scored as high susceptibility due to presence of bacteria or a VOC, SOC or an IOC above the maximum contaminant level in the tested drinking water

Section 4. Options for Source Water Protection

The susceptibility assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what the susceptibility ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require education and surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

An effective source water protection program is tailored to the particular local source water protection area. The State of Idaho and local health districts have instituted enhanced protection of the ground water in the Rathdrum Prairie Aquifer because of its high use and uniquely pristine water quality. The protections are generally aquifer wide and are not aimed at zones of contribution to a specific well or water system. *The Spokane Valley-Rathdrum Prairie Atlas*, sent to water systems on the prairie when they were invited to perform an enhanced contaminant inventory, describes some of the regional protection measures.

The 186 public water systems in Idaho that draw water from the Rathdrum Prairie Aquifer should consider forming a regional group to represent their interests before state, county and municipal governing bodies when regulatory tools like zoning overlays, or enactment of building codes are the most appropriate ground water protection measures. These types of measures could be used to protect the capture zones of a specific system or group of wells that could be put at risk from local land use changes.

Singer Ranch Water System has completed the extensive repairs to the well head that appear to have been effective for preventing bacterial contamination problems from reoccurring. The system has also acquired the deed to the land immediately surrounding the well so it can control activity there to prevent ground water contamination. The system may want to put a security fence around the well lot, and should ensure that anybody doing maintenance in the sanitary setback zone is instructed to keep this area free from the use or storage pesticides, herbicides, solvents, and petroleum products. Homeowners in the service area should be encouraged to install and maintain back flow prevention devices, particularly on automatic irrigation systems and stock tanks.

Due to the time involved with the movement of ground water, wellhead protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term.

Assistance

Public water suppliers and users may call the following IDEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the IDEQ office for preliminary review and comments.

Coeur d'Alene Regional DEQ Office (208) 769-1422

State IDEQ Office (208) 373-0502

Website: http://www.deq.state.id.us

Water suppliers serving fewer than 10,000 persons may contact John Bokor, Idaho Rural Water Association, at (208) 343-7001 for assistance with wellhead protection strategies.

References Cited

Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers, 1997. "Recommended Standards for Water Works."

Idaho Department of Agriculture, 1998. Unpublished Data.

Idaho Division of Environmental Quality, 1994. Ground Water and Soils Reconnaissance of the Lower Payette Area, Payette County, Idaho. Ground Water Quality Technical Report No. 5. Idaho Division of Environmental Quality. December 1994.

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Idaho Department of Water Resources, 1993. Administrative Rules of the Idaho Water Resource Board: Well Construction Standards Rules. IDAPA 37.03.09.

Natural Resource Conservation Service, 1991. Idaho Snake-Payette Rivers Hydrologic Unit Plan of Work. March 1991.

United States Geological Survey, 1986. Quality of Ground Water in the Payette River Basin, Idaho. United States Geological Survey. Water Resources Investigation Report 86-4013.

University of Idaho. 1986. Ground Water Resources in a Portion of Payette County, Idaho. Idaho Water Resources Research Institute. University of Idaho. Moscow, Idaho. April 1986.

Attachment A

Singer Ranch Water System Susceptibility Analysis Worksheet

Ground Water Susceptibility

Public Water System Name : **SINGER RANCH WATER SYSTEM** Source: **WELL #1**

Public Water System Number : **1280174** 10/30/01 3:11:08 PM

1. System Construction		SCORE			
Drill Date	1964				
Driller Log Available	YES				
Sanitary Survey (if yes, indicate date of last survey)	YES 1995				
Well meets IDWR construction standards	NO	1			
Wellhead and surface seal maintained	YES	0			
Casing and annular seal extend to low permeability unit	UNKNOWN	2			
Highest production 100 feet below static water level	NO	1			
Well located outside the 100 year flood plain	YES	0			
Total System Construction Score		**4**			
2. Hydrologic Sensitivity					
Soils are poorly to moderately drained	NO	2			
Vadose zone composed of gravel, fractured rock or unknown	UNKNOWN	1			
Depth to first water > 300 feet	NO	1			
Aquitard present with > 50 feet cumulative thickness	UNKNOWN	2			
Total Hydrologic Score		**6**			
		IOC	VOC	SOC	Microbial
3. Potential Contaminant / Land Use - ZONE 1A (Sanitary Setback)		Score	Score	Score	Score
Land Use Zone 1A	RANGELAND, WOODLAND	0	0	0	0
Farm chemical use high	NO	0	0	0	
IOC, VOC, SOC, or Microbial sources in Zone 1A	NO	NO	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		**0**	**0**	**0**	**0**
Potential Contaminant / Land Use - ZONE 1B (3 YR. TOT)					
Contaminant sources present (Number of Sources)	YES	1	2	2	1
(Score = # Sources X 2) 8 Points Maximum		2	4	4	2
Sources of Class II or III leacheable contaminants or Microbials	YES	1	1	1	
4 Points Maximum		1	1	1	
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0
Land use Zone 1B	Greater Than 50% Irrigated Agricultural	4	4	4	4
Total Potential Contaminant Source / Land Use Score - Zone 1B		**7**	**9**	**9**	**6**
Potential Contaminant / Land Use - ZONE II (6 YR. TOT)					
Contaminant Sources Present	YES	2	2	2	
Sources of Class II or III leacheable contaminants or Microbials	YES	1	1	1	
Land Use Zone II	Less than 25% Agricultural Land	0	0	0	
Potential Contaminant Source / Land Use Score - Zone II		**3**	**3**	**3**	**0**
Potential Contaminant / Land Use - ZONE III (10 YR. TOT)					
Contaminant Source Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or Microbials	NO	0	0	0	
Is there irrigated agricultural lands that occupy > 50% of Zone	NO	0	0	0	
Total Potential Contaminant Source / Land Use Score - Zone III		**0**	**0**	**0**	**0**
Cumulative Potential Contaminant / Land Use Score		**10**	**12**	**12**	**6**
4. Final Susceptibility Source Score		**12**	**12**	**12**	**12**
5. Final Well Ranking		Moderate	Moderate	Moderate	Moderate

POTENTIAL CONTAMINANT INVENTORY
LIST OF ACRONYMS AND DEFINITIONS

AST (Aboveground Storage Tanks) – Sites with aboveground storage tanks.

Business Mailing List – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

CERCLIS – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as Superfund is designed to clean up hazardous waste sites that are on the national priority list (NPL).

Cyanide Site – DEQ permitted and known historical sites/facilities using cyanide.

Dairy – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

Deep Injection Well – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

Enhanced Inventory – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

Floodplain – This is a coverage of the 100year floodplains.

Group 1 Sites – These are sites that show elevated levels of contaminants and are not within the priority one areas.

Inorganic Priority Area – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

Landfill – Areas of open and closed municipal and non-municipal landfills.

LUST (Leaking Underground Storage Tank) – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

Mines and Quarries – Mines and quarries permitted through the Idaho Department of Lands.)

Nitrate Priority Area – Area where greater than 25% of wells/springs show nitrate values above 5mg/l.

NPDES (National Pollutant Discharge Elimination System) – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

Organic Priority Areas – These are any areas where greater than 25 % of wells/springs show levels greater than 1% of the primary standard or other health standards.

Recharge Point – This includes active, proposed, and possible recharge sites on the Snake River Plain.

RICRIS – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities) – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

Toxic Release Inventory (TRI) – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

UST (Underground Storage Tank) – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

Wastewater Land Applications Sites – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

Wellheads – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

NOTE: Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

Where possible, a list of potential contaminant sites unable to be located with geocoding will be provided to water systems to determine if the potential contaminant sources are located within the source water assessment area.